What Is Claimed Is:

1. A capillary structure for a heat transfer device comprising:

a plurality of particles joined together by a brazing compound such that fillets of said brazing compound are formed between adjacent ones of said plurality of particles so as to form a network of capillary passageways between said particles wherein at least one vapor vent is defined through said capillary structure.

2. A capillary structure according to claim 1 wherein said plurality of particles comprise a first melting temperature and said brazing compound comprises a second melting temperature that is lower than said first melting temperature.

3. A capillary structure according to claim 1 wherein said brazing compound comprises about sixty-five percent weight copper and thirty-five percent weight gold particles such that said fillets of said brazing compound are formed between adjacent ones of said plurality of particles so as to create a network of capillary passageways between said particles.

4. A capillary structure according to claim 1 wherein said fillets are formed by capillary action of said braze compound when in a molten state.

5. A capillary structure according to claim 1 wherein said metal particles are selected from the group consisting of carbon, tungsten, copper, aluminum, magnesium, nickel, gold, silver, aluminum oxide, and beryllium oxide.

6. A capillary structure according to claim 1 wherein said metal particles comprise a shape selected from the group consisting of spherical, oblate spheroid, prolate spheroid, ellipsoid, polygonal, and filament.

7. A capillary structure according to claim 1 wherein said metal particles comprise at least one of copper spheres and oblate copper spheroids having a melting point of about one thousand eighty-three °C.

8. A capillary structure according to claim 3 wherein said brazing compound comprises six percent by weight of a finely divided copper/gold brazing compound.

9. A capillary structure according to claim 3 wherein said brazing compound is present in the range from about two percent to about ten percent.

10. A capillary structure according to claim 3 wherein said metal particles comprise copper powder comprising particles sized in a range from about twenty mesh to about two-hundred mesh.

11. A capillary structure according to claim 3 wherein said braze compound particles comprise about minus three hundred and twenty-five mesh.

12. A capillary structure according to claim 1 wherein said metal particles that are a constituent portion of said braze compound comprise a smaller size than said metal particles.

13. A capillary structure according to claim 1 wherein said braze compound is selected from the group consisting of nickel-based Nicrobrazes, silver/copper brazes, tin/silver, lead/tin, and polymers.

14. A capillary structure according to claim 1 wherein said plurality of metal particles comprise aluminum and magnesium and said brazing compound comprises an aluminum/magnesium intermetallic alloy.

15. A capillary structure for a heat transfer device comprising:

a plurality of particles joined together by a brazing compound such that fillets of said brazing compound are formed between adjacent ones of said plurality of particles so as to form a network of capillary passageways between said particles wherein a plurality of vapor vents are defined through said capillary structure.

16. A capillary structure according to claim 15 wherein said vapor vents comprise a cross-sectional profile selected from the group consisting of cylindrical, conical, frustoconical, triangular, pyramidal, rectangular, rhomboidal, pentagonal, hexagonal, octagonal, polygonal and curved.

17. A heat pipe comprising:

a hermetically sealed and partially evacuated enclosure, said enclosure comprising internal surfaces;

a wick disposed on at least one of said internal surfaces and comprising a plurality of particles joined together by a brazing compound such that fillets of said brazing compound are formed between adjacent ones of said plurality of particles so as to form a network of capillary passageways between said particles wherein at least one vapor vent is defined through said capillary structure; and

a two-phase fluid at least partially disposed within a portion of said wick.

18. A heat pipe according to claim 17 wherein said plurality of particles comprise a first melting temperature and said brazing compound comprises a second melting temperature that is lower than said first melting temperature.

19. A heat pipe according to claim 17 wherein said brazing compound comprises about sixty-five percent weight copper and thirty-five percent weight gold such that said fillets of said brazing compound are formed between adjacent ones of said plurality of particles so as to create a network of capillary passageways between said particles.

20. A heat pipe according to claim 17 wherein said fillets are formed by capillary action of said braze compound when in a molten state.

21. A heat pipe according to claim 17 wherein said metal particles are selected from the group consisting of carbon, tungsten, copper, aluminum, magnesium, nickel, gold, silver, aluminum oxide, and beryllium oxide.

22. A heat pipe according to claim 17 wherein said metal particles comprise a shape selected from the group consisting of spherical, oblate spheroid, prolate spheroid, polygonal, and filament.

23. A heat pipe according to claim 17 wherein said metal particles comprise at least one of copper spheres and oblate copper spheroids having a melting point of about 1083°C.

24. A heat pipe according to claim 17 wherein said brazing compound comprises six percent by weight of a finely divided copper/gold brazing compound.

25. A heat pipe according to claim 17 wherein said brazing compound is present in the range from about two percent to about ten percent.

26. A heat pipe according to claim 17 wherein said metal particles comprise copper powder comprising particles size in a range from about twenty mesh to about two-hundred mesh.

27. A capillary structure according to claim 17 wherein said braze compound particles comprise about minus three hundred and twenty-five mesh.

28. A heat pipe according to claim 18 wherein said metal particles that are a constituent portion of said braze compound comprise a smaller size than said metal particles.

29. A heat pipe according to claim 17 wherein said braze compound is selected from the group consisting of nickel-based Nicrobrazes, silver/copper brazes, tin/silver, lead/tin, and polymers.

30. A heat pipe according to claim 17 wherein said plurality of metal particles comprise aluminum and magnesium and said brazing compound comprises an aluminum/magnesium intermetallic alloy.

31. A heat pipe comprising a sealed and partially evacuated tubular enclosure having an internal surface covered by a brazed wick comprising a plurality of copper particles joined together by a brazing compound comprising about sixty-five percent weight copper and thirty-five percent weight gold such that fillets of said brazing compound are formed between adjacent ones of said plurality of particles so as to form a network of capillary passageways between said particles and including a plurality of vapor vents defined through said wick; and

a working fluid disposed within said tubular enclosure.

32. A heat pipe comprising:

a sealed and partially evacuated enclosure having an internal surface;

a wick disposed upon said internal surface comprising a plurality of individual particles which together yield an average particle diameter and a brazing compound such that fillets of said brazing compound are formed between adjacent ones of said plurality of particles, and further including at least one vapor vent that is defined through a portion of said wick having a particle layer at the bottom of each vapor-vent wherein said particle layer comprises at least one dimension that

is no more than about six average particle diameters wherein said particles in said particle layer are thermally engaged with one another by a plurality of said fillets; and

a working fluid disposed within said enclosure.

33. A heat pipe according to claim 32 wherein said plurality of metal particles comprise a first melting temperature and said brazing compound comprises a second melting temperature that is lower than said first melting temperature.

34. A heat pipe according to claim 32 wherein said brazing compound comprises about sixty-five percent weight copper and thirty-five percent weight gold such that said fillets of said brazing compound are formed between adjacent ones of said plurality of particles so as to create a network of capillary passageways between said particles.

35. A heat pipe according to claim 32 wherein said fillets are formed by capillary action of said braze compound when in a molten state.

36. A heat pipe according to claim 32 wherein said metal particles are selected from the group consisting of carbon, tungsten, copper, aluminum, magnesium, nickel, gold, silver, aluminum oxide, and beryllium oxide.

37. A heat pipe according to claim 32 wherein said metal particles comprise a shape selected from the group consisting of spherical, oblate spheroid, prolate spheroid, polygonal, and filament.

38. A heat pipe according to claim 32 wherein said metal particles comprise at least one of copper spheres and oblate copper spheroids having a melting point of about 1083°C.

39. A heat pipe according to claim 32 wherein said brazing compound comprises six percent by weight of a finely divided copper/gold brazing compound.

40. A heat pipe according to claim 33 wherein said brazing compound is present in the range from about two percent to about ten percent.

41. A heat pipe according to claim 33 wherein said metal particles comprise copper powder comprising particles size in a range from about twenty mesh to about two-hundred mesh.

42. A heat pipe according to claim 33 wherein said braze compound particles comprise no more than minus three hundred and twenty-five mesh.

43. A heat pipe according to claim 32 wherein said metal particles that are a constituent portion of said braze compound comprise a smaller size than said metal particles.

44. A heat pipe comprising:

a sealed and partially evacuated enclosure having an internal surface;

a wick disposed upon said internal surface comprising a plurality of sintered particles which together yield an average particle diameter, and further including at least one vapor vent that is defined through a portion of said wick having a particle layer at the bottom of each vapor-vent wherein said particle layer comprises at least one dimension that is no more than about six average particle diameters; and

a working fluid disposed within said enclosure.

45. A heat pipe comprising:

a sealed and partially evacuated enclosure having an internal surface;

a wick disposed upon said internal surface comprising a plurality of sintered particles which together yield an average particle diameter, and further including at least one vapor vent that is defined through a portion of said wick; and

a working fluid disposed within said enclosure.

46. A heat pipe according to claim 45 wherein said braze compound is selected from the group consisting of nickel-based Nicrobrazes, silver/copper brazes, tin/silver, lead/tin, and polymers.

47. A heat pipe according to claim 45 wherein said plurality of metal particles comprise aluminum and magnesium and said brazing compound comprises an aluminum/magnesium intermetallic alloy.

48. A heat pipe comprising:

a sealed and partially evacuated tubular enclosure having an internal surface covered by a brazed wick comprising a plurality of particles joined together by a brazing compound such that fillets of said brazing compound are formed between adjacent ones of said plurality of particles so as to form a network of capillary passageways between said particle and sealed at a first end;

a base sealingly fixed to a second end of said enclosure so as to form an internal surface within said enclosure wherein said wick formed on said base includes at least one vapor vent that is defined through a portion of said wick;

a working fluid disposed within said enclosure; and

at least one fin projecting radially outwardly from an outer surface of said tubular enclosure.

49. A heat pipe comprising:

a sealed and partially evacuated tubular enclosure having an internal surface covered by a wick comprising a plurality of sintered particles so as to form a network of capillary passageways between said particle and sealed at a first end;

a base sealingly fixed to a second end of said enclosure so as to form an internal surface within said enclosure wherein said wick formed on said base includes at least one vapor vent that is defined through a portion of said wick;

a working fluid disposed within said enclosure; and

at least one fin projecting radially outwardly from an outer surface of said tubular enclosure.

50. A method for making a capillary structure on an inside surface of a container, comprising the steps of:

(a) providing a slurry of metal particles that are mixed with a brazing compound wherein said metal particles comprise a first melting temperature and said brazing compound comprises a second melting temperature that is lower than said first melting temperature;

(b) coating at least portion of said inside surface of said container with said slurry so as to define vapor-vents in said slurry;

(c) drying said slurry to form a green wick; and,

(d) heating said green wick to a temperature that is no less than said second melting temperature and below said first melting temperature so that said

brazing compound is drawn by capillary action toward adjacent of said metal particles so as to form heat-distribution fillets between said adjacent metal particles thereby to yield a brazed wick.

51. A capillary structure formed according to the method of claim 50.

52. The method of claim 50 comprising the step of mixing two drops of an organic liquid binder with said slurry of metal particles to create an adhesive quality on their surface.

53. The method of claim 52 wherein said organic liquid binder comprises isobutyl methacrylate lacquer.

54. The method of claim 50 wherein step (a) comprises mixing six percent weight of copper/gold in a ratio of 65%/35% of finely divided minus three hundred and twenty-five mesh with an organic liquid binder coated copper powder and allowing said mixture to thoroughly air dry.

55. The method of claim 50 wherein step (b) comprises coating a copper surface with an organic binder;

sparsely coating said copper surface with brazing compound comprising six percent weight of copper/gold in a ratio of 65%/35% of finely divided, minus three hundred and twenty-five mesh; and

removing excess brazing compound from said copper surface.

56. The method of claim 50 wherein step (b) further comprises placing a mandrel on top of said slurry so as to form a plurality of grooves in said green wick.

57. The method of claim 50 wherein step (d) comprises vacuum firing said green wick at 1020° C. for five minutes wherein said vacuum is no more than 5x10-5 torr.

58. A method for making a heat pipe wick on an inside surface of a heat pipe container, comprising the steps of:

(a) positioning a mandrel having a plurality of posts within a portion of said container;

(b) providing a slurry of metal particles having an average particle diameter and that are mixed with a brazing compound wherein said metal particles comprise a first melting temperature and said brazing compound comprises a second melting temperature that is lower than said first melting temperature;

(c) coating at least portion of the inside surface of said container with said slurry so that said slurry conforms to the contour of said mandrel and forms a layer of slurry between adjacent posts;

(d) drying said slurry to form a green wick; and,

(e) heating said green wick to a temperature that is no less than said second melting temperature and below said first melting temperature so that said brazing compound is drawn by capillary action toward adjacent of said metal particles so as to form heat-distribution fillets between said adjacent metal particles thereby to yield a brazed wick.